

# Tobacco Disease

## Frog Eye Leaf spot

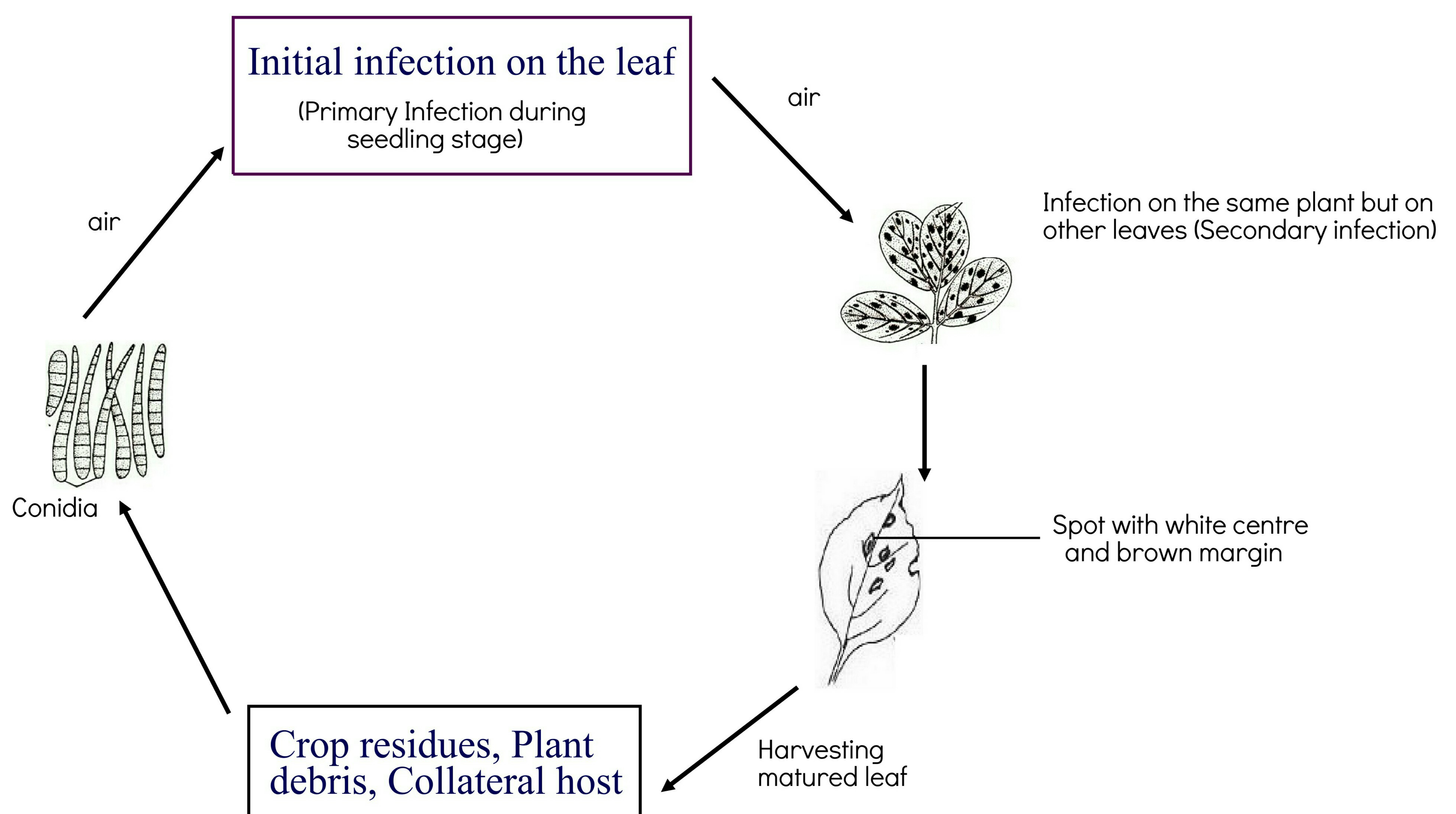
**Causal organism:** *Cercospora nicotianae*.

### Symptoms

1. Small roundish spots are developed on the leaves, specially on the older leaves.
2. The spots enlarge and become roughly circular in shaped.
3. The centre of the spots turns white or pale brown surrounded by a dark black margin resembling the eye of a frog.
4. More than one lesion coalesce together to form a bigger lesions and maximum portion of leaves dry down and finally fallen it.



### Disease Cycle (*Figure of Cercospora nicotianae* Life cycle)





The fungus may over winter in the crop residues, plant debris and on the collateral host. From this source, the air borne conidia cause primary infection then favourable condition, it may cause secondary infection.

### **Favourable condition**

- Close plantation.
- Frequent irrigation/rainfall.
- High Relative humidity, above 80%.
- Excess use of nitrogenous fertilizer.
- Windy weather.
- Insect infestation.
- Present of wounds.

### **Control Measure**

#### **A. Cultural method**

Cultural method is good for minimizing the disease;

- ◆ Optimum fertilizer management.
- ◆ Optimum irrigation as an when necessary.
- ◆ Weeding of collateral host.
- ◆ Sanitation of the field.

#### **B. Chemical method**

- ◆ Spraying Bordeaux mixture usually 2 times at 10-12 days interval.
- ◆ Spraying of fungicides like Macuprax, Cupravit, Dithane M-45 @ 2% solution at 2-3 times onset of disease at 20 days interval.

## **Mosaic of Tobacco**

**Causal organism:** Tobacco Mosaic Virus (TMV).

### **Origin**

Adlof Mayer at first reported this disease in 1886. In 1892 Iwanowski demonstrated that tobacco mosaic virus would pass through a bacteria-proof filter. It is the first reported viral disease in the world. Has long association with other viral diseases.

## Symptoms

1. Discoloured vein/Yellowing of the vein of leaf.
2. Green patches and yellow patches are alternate with each other. This is the most characteristics symptom of leaf mosaic of tobacco.
3. Three type of characters such as mottling, Distortation and Stunting are seen on the leaves.
4. Infected bud leaves become twisted and malformed.
5. If infection make earlier, severe dwarfing of plant reduced yield and reduction yield quality.

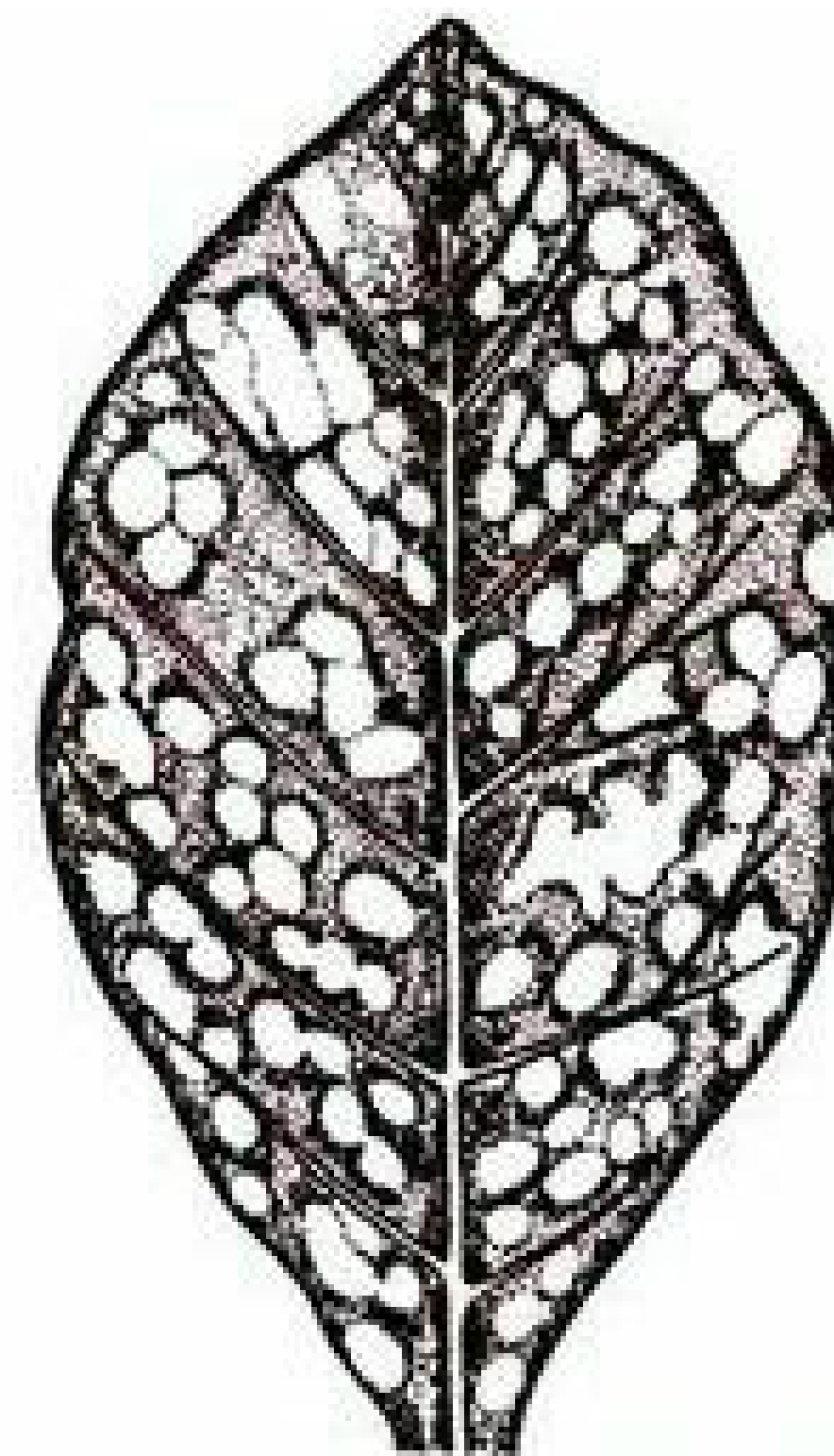


Fig. 1. Tobacco leaf showing the mosaic symptoms.

## Favourable condition

- Excess use of nitrogenous fertilizer.
- Windy weather.
- Insect infestation.
- Present of wounds.

## Intensity of disease

Intensity of disease depend on physical and environmental condition. The virus can survive in dried tobacco leaves upto 5 years and infected plant juice upto 25 years.

## Transmission

TMV transmitted by sap. It is done mechanically (Animal, knife, labour hands etc).



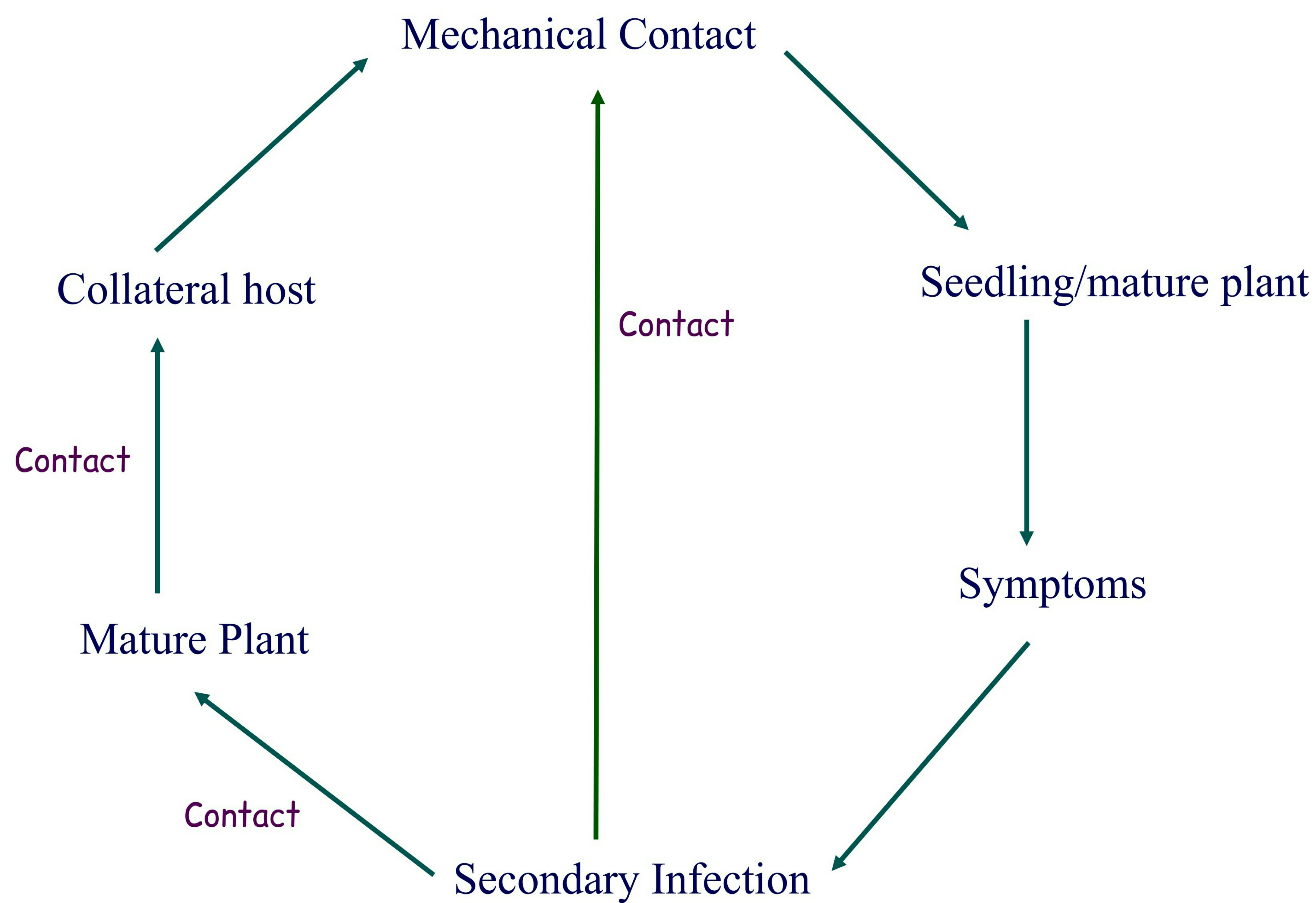


Fig: Transmission Cycle of Tobacco Mosaic Virus (Mechanical)

### Control Measure

- ◆ Field sanitation.
- ◆ Highly contagious disease; washed the used implements as well as labour hands by running water.
- ◆ Roughing and cultural practices.
- ◆ Seed bed soil should be sterilized by steam.
- ◆ Destruction of collateral host.
- ◆ Balanced fertilizer are used (optimum Nitrogenous fertilizer).
- ◆ No chemical is recommend for TMV.

## Leaf Curl

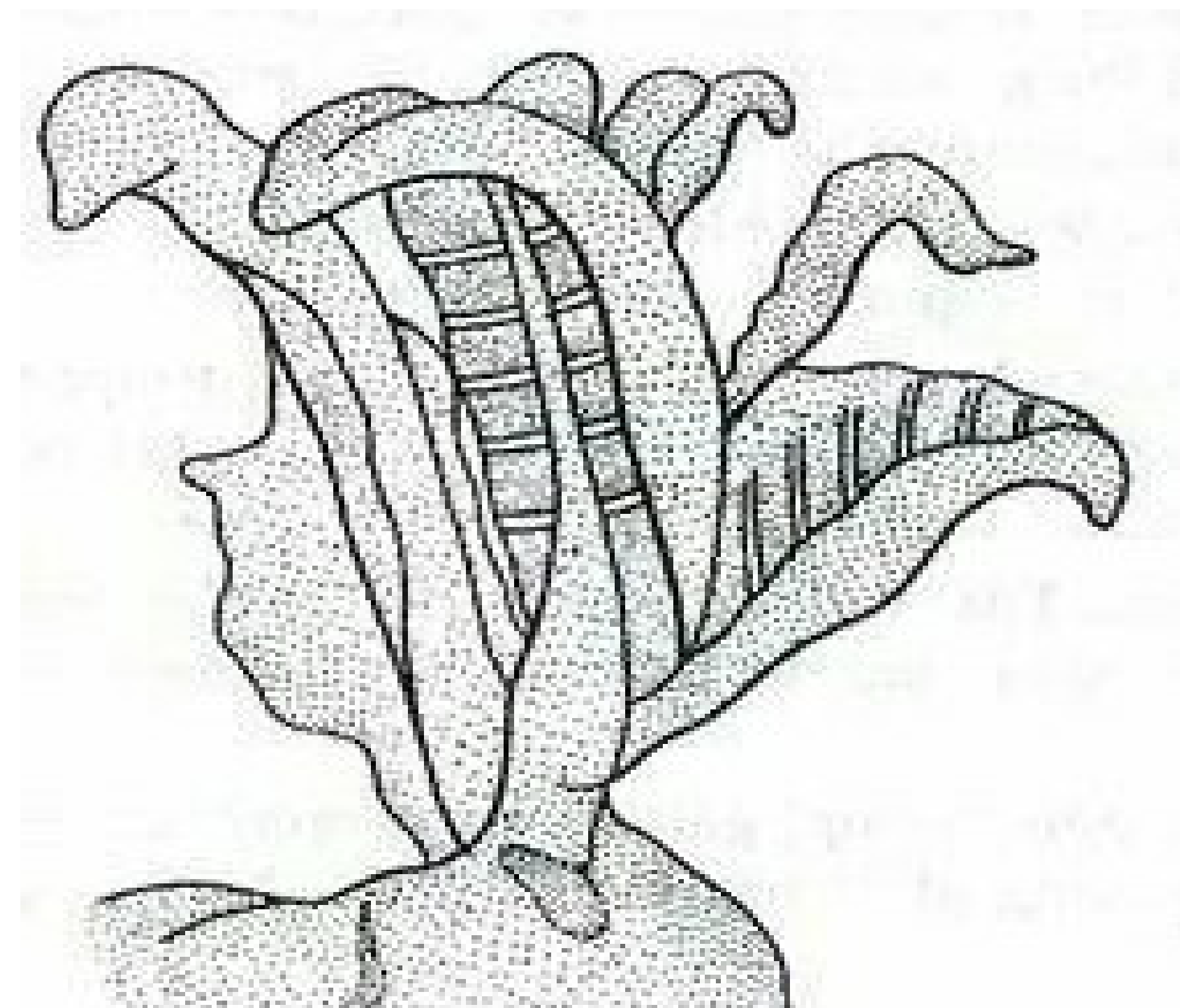
**Causal organism:** Tobacco leaf curl virus.

### Symptoms

1. There is no change in the colour of the infected leaves.
2. Size of the leaves are usually smaller.



3. Downward turning of the infected leaf, exposed in the mid rib. The mid rib exposed upward giving an inverted boat shaped.
4. Leaf blade will be thicker.
5. Young apical leaves become twisted.
6. Plant become dwarf and inflorescence remain condensed.



### **Favourable condition**

- Excess use of nitrogenous fertilizer.
- Windy weather.
- Insect infestation.
- Present of wounds.

**Transmission Cycle:** Same as tobacco mosaic disease.

### **Control Measure**

- ◆ Remove and destroy the infected plants.
- ◆ Rogue out the reservoir weed hosts which harbour the virus and whiteflies. Planting tobacco crop during the crop periods when the vector population is low.
- ◆ Field sanitation.
- ◆ Highly contagious disease; washed the used implements as well as labour hands by running water.
- ◆ Balanced fertilizer are used (optimum Nitrogenous fertilizer).
- ◆ Spraying Sevin 85 WP @ 1.7 kg/ha for control white fly.



# Disease of Tea

## Blister Blight

**Causal organism:** *Exobasidium vexans*.

### Symptoms

1. Brown to pink lesions developed on the upper surface of leaves. They become circular, blister like swelling both surface of leaf.
2. Lesion color will be deep red.
3. The concave symptom is depressed and become white, soft.
4. Such type of lesions coalesce together formed a bigger lesion and finally leaves may drop off.



### Disease Cycle

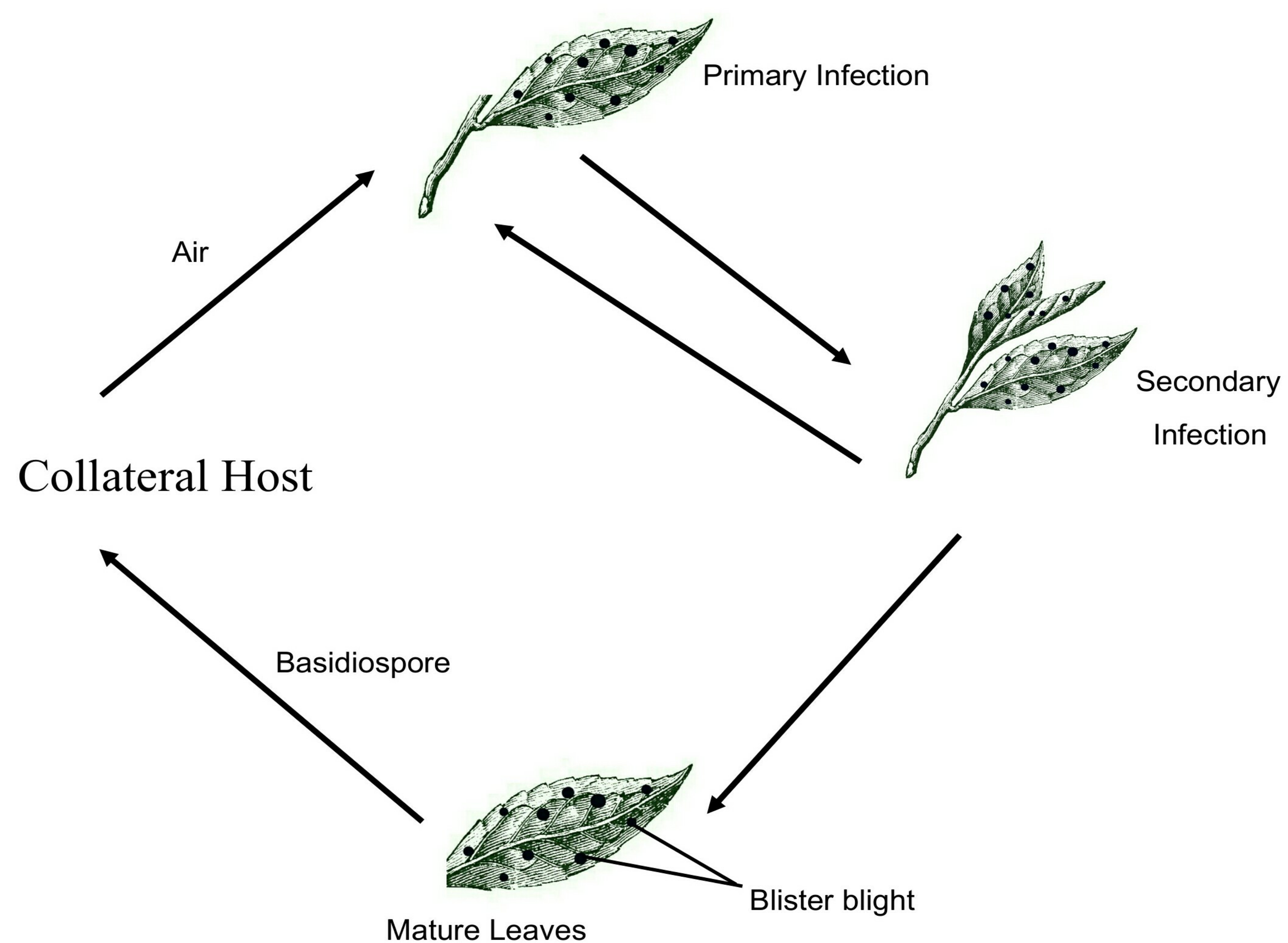


Fig: Disease Cycle of Blister blight of Tea



## Source of Infection

Source of primary infection, the pathogen remain in the infected bush on the collateral host or form the soil. Secondary infection is made by air, rain splash.

## Favourable condition

- ▲ High relative humidity (greater than 85%).
- ▲ Frequent rainfall.
- ▲ Strong wind.
- ▲ Movement of labour during harvesting.

## Control Measure

- ◆ Removal of infected branches by pruning.
- ◆ Field sanitation.
- ◆ Soil drench will be made in seedling line. 4 g/m<sup>2</sup> plant vax usually 2 times in 2-3 weeks interval.
- ◆ After each Plucking, fungicidal (specially Copper fungicides) spray would be done at 10-15 days interval.
- ◆ Spraying with Vitavax-200 @ 5-10 g/mature plant at 35-40 days interval.

# Red Rust

**Causal organism:** *Cephaleurous parasiticus* (Algal disease).

## Symptoms

1. Rusty lesions developed on the leaves. They are roundish in shape.
2. Reddish hairs like structure develops on the leaves.

## Favourable condition

- ▲ Bright sunshine.
- ▲ Disease emergence favored by high temperature and humidity.

## Control Measures

- ◆ By obstruct sunshine with the help of shed trees.
- ◆ Skillful pruning and plucking of bud leaf.
- ◆ Provide adequate space between plants to maximize air circulation around foliage.
- ◆ 2% MoP and Urea can be sprayed as a rehabilitary measure in the severely affected sections.
- ◆ Spraying of fungicides should be directed towards the young stems and laterals bearing rusty fructifications.

## Stem Canker

**Causal organism:** *Macrophoma theicola*.

### Symptoms

1. At the initial stage, a discolouration is produced on the leaf.
2. The cork is removed and the wood become visible. In this stage, the mycelia are already inside the cambium region.
3. In cross section, the channel of discolouration is found along the cambium region.

### Favourable condition

- ▲ High relative humidity (greater than 85%).
- ▲ Frequent rainfall.
- ▲ Strong wind.
- ▲ Movement of labour during harvesting.
- ▲ Hail storm.

### Control measures

- ◆ Removal of infected branches by pruning.
- ◆ Field sanitation.
- ◆ Pruning infected shoot and applying paint on the cut surface.



- ◆ Spraying Cupravit/Macuprax/Dithane M-45 @ 0.2-0.3% solution @ 800-1000 gallons/ha at 21 days interval until the disease is significantly reduced.

## **Disease of Betel Vine**

### **Anthracnose/Leaf Spot**

**Causal organism:** *Colletotrichum piperis*.

#### **Symptoms**

1. The leaves show small, black, circular spots initially which later enlarge and develop to a size of 2 cm, become concentric and covered with a yellow halo.
2. The affected leaves turn pale yellow and dry up with large black dots in the center of the spots.
3. Black, circular lesion may develop on the stem, enlarge rapidly and girdle the stem resulting in withering and drying.

#### **Favourable condition**

In high humidity, it spread rapidly.

#### **Control Measures**

- ◆ Collect and destroy the infected leaves.
- ◆ Cultivate resistant varieties. e.g. BARI pan-1, BARI pan-2.
- ◆ Spray with 0.2% Ziram or 0.5% Bordeaux mixture after plucking the leaves.
- ◆ Spraying Tilt 250 EC @ 0.5 mL/L of water at 2-3 times in 10 days interval.



## **Foot rot/Stem rot/Collar rot**

**Causal organism:** *Sclerotium rolfsii*.

### **Symptoms**

1. The vines of all stages are susceptible to the disease.
2. The infection usually starts at the collar region.
3. Whitish cottony mycelium is seen on the stem and roots.
4. Brown coloured mustard like sclerotia are seen on the infected stem and soil near the vines.
5. The stem portion shows rotting of tissues at the plant of attack and the plant shows dropping of the leaves and withering finally dry up.

### **Favourable condition**

- ▲ High temperature of 28-30<sup>0</sup> C.
- ▲ Organic fertilizer rich soil and plant debris are favour for disease.

### **Control Measures**

- ◆ Remove the affected vines with the roots and burned.
- ◆ Apply more of soil amendments like neem cake, mustard cake.
- ◆ Apply Trichoderma compost fertilizer @ 5g/plant.
- ◆ Treated vine with Provex/Bavistin @ 2g/L of water before planting.
- ◆ Drench the soil with 0.1% carbendazim.
- ◆ After found the disease, spraying Provex/Bavistin @ 2g/L of water on foot of plant near the soil.



## **Root rot**

**Causal organism:** *Rhizoctonia solani*.

### **Symptoms**

1. Leaf pale at primary stage of infection.
2. Then leaf become discolouration and die.
3. In this time, root shows red colour and splitted into small portion.

### **Control Measures**

Same as foot rot.

## **Fruit Rot of Betel nut**

**Causal organism:** *Phytophthora palmivora*.

### **Symptoms**

1. The first symptoms are water-soaked lesions on the nut surface near the calyx.
2. The patches enlarge and nuts darken and are shed in large numbers. A fallen nut is soon covered by a whitish mycelial mass.
3. Fruit stalks and rachis of inflorescence are also affected. Very often the top of the affected trees dries up resulting in withering of leaves and bunches.

### **Control Measures**

1. Clean cultivation.
2. Destruction of affected trees.
3. Collection and burning of fallen nuts.
4. Spray Bordeaux mixture 1% on all bunches twice an year once before the onset of monsoon and another 40 days later.
5. Spraying Macuprax @ 1.5 % solution at 3-4 times after 15-30 days interval.



# Rhizome and Root rot of Turmeric and Ginger

**Causal organisms:** *Pythium graminicolum* and *P. aphanidermatum*.

The disease is soil-borne and rhizomes borne and occurs with the onset of monsoon.

## Symptoms

### Above ground

1. The infection starts at the collar region of the pseudostem and progresses upwards as well as downwards.
2. The collar region of the affected pseudostem becomes water soaked and the rotting spreads to the rhizome resulting in soft rot.
3. Foliar symptoms appear as light yellowing of the tips of lower leaves which gradually spreads to the leaf blades.
4. In early stages of the disease, the middle portion of the leaves remain green while the margins become yellow.
5. Later, the yellowing spreads to all leaves of the plant from the lower region upwards and is followed by drooping, withering and drying of pseudostems.

### Below Ground

1. At a later stage, Fungal infection decays the rhizome as well as roots.
2. Poorly developed roots and less formation of the rhizome are the other symptoms.

## Favourable conditions

- ▲ Younger sprouts are the most susceptible to the pathogen. Nematode infestation aggravates rhizome rot disease.
- ▲ Temperature above 30°C and high soil moisture are the important predisposing factors favouring the disease.
- ▲ Water logging in the field due to poor drainage increases the intensity of the disease.

## Control Measures

- ◆ Seed material should be selected from disease free areas.
- ◆ Avoid water stagnation in the field. Light soil may be preferred and drainage facility to be ensured.



- ◆ Grow tolerant varieties.
- ◆ Crop rotation to be followed.
- ◆ Deep plough in summer. Planting is to be done in ridge and furrow method.
- ◆ Remove diseased plants and the soil around plants to be drenched with Mancozeb (3 gm/lit) or 3 gm Ridomil M.Z.
- ◆ At the time of sowing, treat the rhizome with Bordeaux mixture (1%) and again with Trichoderma @ 8-10-gm/litre water.
- ◆ Spray the crop with Mancozeb (2.5 g/lit) or Carbendazim (1 g/lit) +1 ml sandovit.
- ◆ Keep rhizomes in 3g Metalaxyl or 3g Mancozeb mixed in one litre of water for one hour and shade dry before planting.

## **Purple blotch/Leaf blotch/Alternaria blight of Onion and Garlic**

**Causal organism:** *Alternaria Porri* .

### **Origin**

The disease was first reported by Ajrekar from Bombay in 1921.

### **Symptoms**

1. Symptoms first appear on leaves or seed stalks as small water soaked lesions that quickly develop white centre.
2. Under favourable condition, these lesions enlarge, coalesce, become zonate and brown to purple that extend upward and downward.
3. In moist weather, the surface of the lesion, may be covered with black fruiting bodies of fungus.
4. The older leaves are more susceptible than younger leaves and younger leaves relatively more susceptible when they emerge close to bulb maturity.
5. Similar lesion may form on seed stalk, as a results seed either do not develop or are shrivelled. The infected plants fail to develop bulbs.
6. Severely infected foliage of onion and garlic may exhibit dieback.



7. The bulb can also be affected at harvest when the fungus enters through the neck or injurious, causing storage rot.

### **Favourable conditions**

Hot and humid climate with temperature ranging from 21-30°C and high relative humidity (80-90%) favour the development of the disease.

### **Control Measures**

- ◆ Healthy seed should be used.
- ◆ Seed should be treated with Thiram @ 4 g/kg of seed.
- ◆ Crop rotation of 2-3 years with non related crops should be followed.
- ◆ Mancozeb @ 0.25% or chlorothalonil @ 0.2% or rovril @ 0.25% should be sprayed at fortnightly interval commencing from one month after transplanting. The sticker triton/sandovit should be mixed in spray solution.

## **Smut of Onion**

**Causal organism:** *Urocystis magica* (syn.= *U. cepulae*) and *U. colchici*.

### **Origin**

Smut was first observed on the onion in the Connecticut river valley of USA in 1869.

### **Symptoms**

1. The earliest symptom are appear on cotyledons and young leaves as longitudinal blisters that are blackish with a silver sheen.
2. Dark pustules (sori) appear as slightly thickened areas at the base of seedlings near ground level. Blisters rupture to expose black, powdery spore masses (smut teliospores).
3. The seedling often die before emergence. Large lesion can cause leaves to curve downward and usually are shed prematurely.
4. Infection progresses inward from leaf to leaf and infected leaf become stunted and may die within 3-4 weeks after emergence.
5. If the plants survive, the disease become systemic and they remain at a vegetative stage for the entire growing season.



6. Elongated, raised black blisters can also be found in the outer scales of the developing bulb.

### **Favourable condition**

- ▲ Optimum temperature for spore germination and growth are 13-22°C.
- ▲ Infection of seedling can occur equally well at temperature of 12-25°C.
- ▲ Above 29°C, Onion seedling grow without infection in even heavily infested soil.

### **Control Measures**

- ◆ Prevent the movement of soil and plant debris among fields to prevent the smut pathogen from being introduced into other fields.
- ◆ Practice a three-year or longer rotation to non-hosts such as small grains and corn.
- ◆ Transplants should be used instead of seed in infested soil.
- ◆ The disease can be controlled by seed treatment with Thiram @ 45 gm for 0.45 kg of seed.
- ◆ Spraying formaldehyde solution in the furrow.